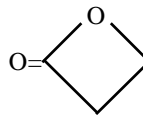


beta-PROPIOLACTONE

beta-Propiolactone is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 57-57-8

Molecular Formula: $C_3H_4O_2$



beta-Propiolactone is a colorless liquid with a pungent, slightly sweetish odor. It is soluble in water and miscible with alcohol, acetone, ether, and most polar solvents and lipids. beta-Propiolactone is slowly hydrolyzed to hydracrylic acid but is stable when stored at 5 °C in glass containers. It has very high chemical reactivity due to the presence of a strained four-membered lactone ring (Merck, 1989).

Physical Properties of beta-Propiolactone

Synonyms: propanolide; 1,3-propiolactone; 2-oxetanone betaprone

Molecular Weight:	72.07
Boiling Point:	162 °C
Melting Point:	-33.4 °C
Vapor Pressure:	3.4 mm Hg at 25 °C
Density/Specific Gravity:	1.1460 at 20/4 °C (water = 1)
Flash Point:	70 °C (158 °F)
Conversion Factor:	1 ppm = 2.95 mg/m ³

(HSDB, 1991; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

beta-Propiolactone is used in the production of haloquinones and polyesters used for polymer blends of polyvinyl chloride. More than 85 percent of beta-propiolactone was produced in the United States for use in the manufacture of acrylic acid and esters. It now has been replaced by other more efficient and less expensive methods (NTP, 1991).

B. Emissions

No emissions of beta-propiolactone from stationary sources in California were reported, based on data obtained under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of beta-propiolactone was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of beta-propiolactone.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of beta-propiolactone was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

No information about the atmospheric persistence of beta-propiolactone was found in the readily-available literature.

AB 2588 RISK ASSESSMENT INFORMATION

beta-Propiolactone emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to beta-propiolactone are inhalation and dermal contact.

Non-Cancer: Acute inhalation exposure to beta-propiolactone causes severe eye and respiratory tract irritation in humans. Acute dermal exposure may cause irritation, blistering, or burns in humans. Eye contact may cause permanent corneal opacification. No information on human chronic health effects of beta-propiolactone is available (U.S. EPA, 1994a).

The United States Environmental Protection Agency (U.S. EPA) has determined that inadequate data exist to establish a Reference Concentration (RfC) for beta-propiolactone, and has not established an oral Reference Dose (RfD) (U.S. EPA, 1994a).

No information is available on the developmental or reproductive effects of beta-propiolactone in humans or animals (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenicity of beta-propiolactone in humans. Evidence from animal studies indicates increased incidence of tumors in test animals.

The U.S. EPA has classified beta-propiolactone as Group B2: Probable human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified beta-propiolactone in Group 2B: Possibly carcinogenic to humans (IARC, 1987a).

The State of California has determined under Proposition 65 that beta-propiolactone is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 4.0×10^{-3} (microgram per cubic meter)⁻¹ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 microgram per cubic meter of beta-propiolactone is estimated to be no greater than 4,000 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 14 (milligram per kilogram per day)⁻¹ (OEHHA, 1994).

